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FIG.1

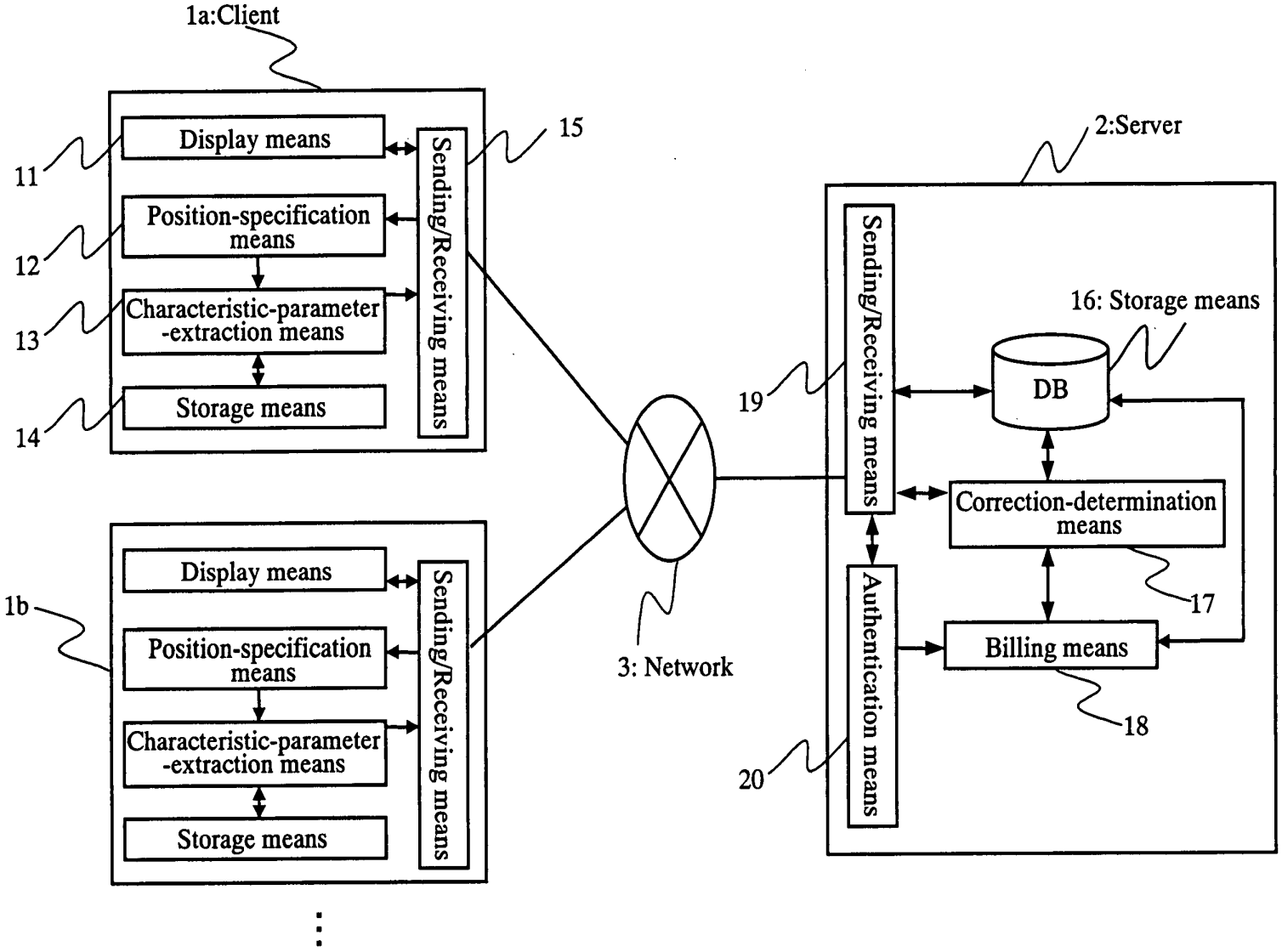

1a:Client
Display means
Position-specification means
Characteristic-parameter -extraction means
Storage means
Sending/Receiving means
11
12
13
14
15
1b
Display means
Position-specification means
Characteristic-parameter -extraction means
Storage means
Sending/Receiving means
3: Network
2:Server
Sending/Receiving means
19
16: Storage means
DB
Correction-determination means
17
Billing means
18
Authentication means
20

FIG.2

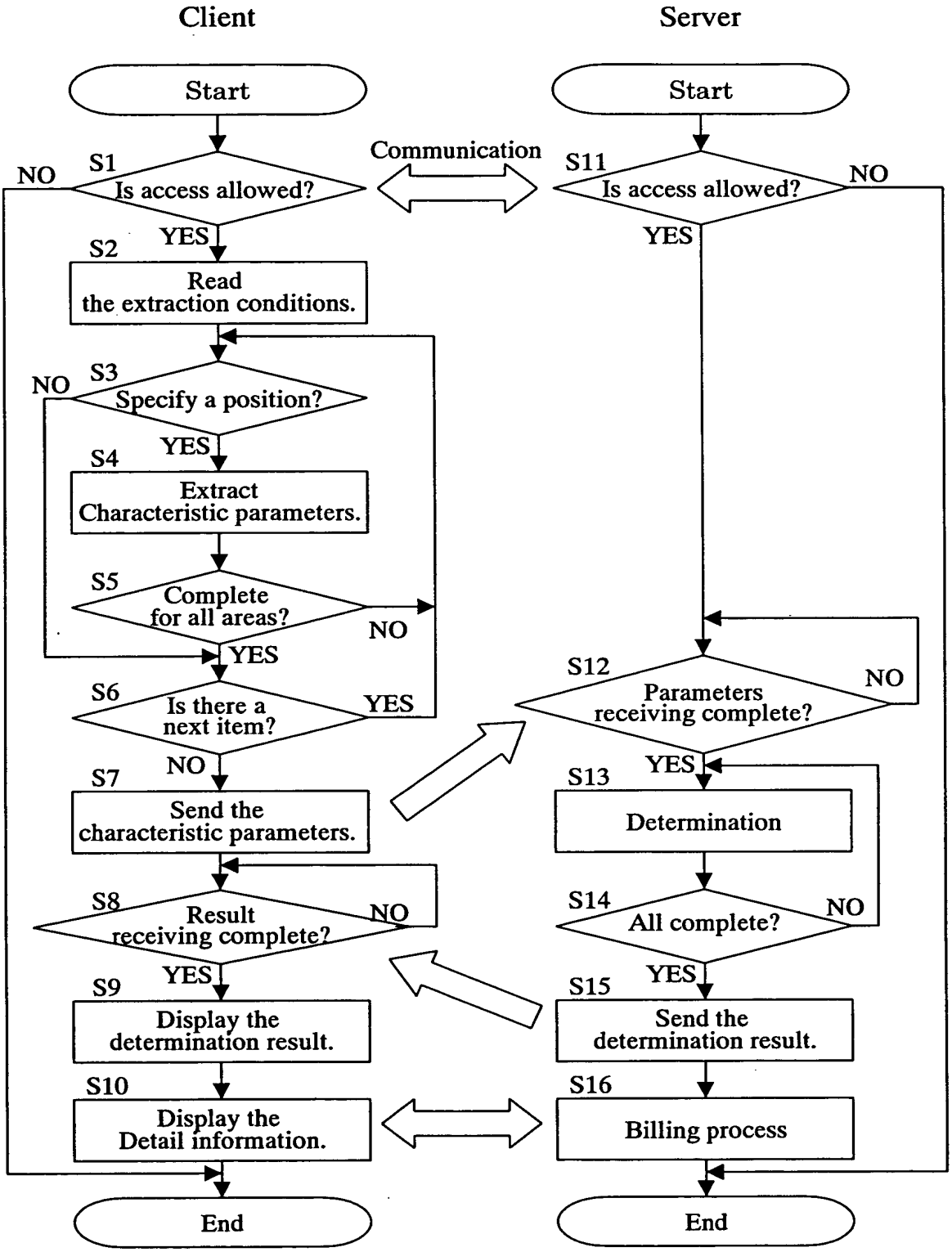

Client
Server
Start
Start
Communication
S1
Is access allowed?
NO
YES
S11
Is access allowed?
NO
YES
S2
Read
the extraction conditions.
S3
Specify a position?
NO
YES
S4
Extract
Characteristic parameters.
S5
Complete
for all areas?
NO
YES
S6
Is there a
next item?
YES
NO
S12
Parameters
receiving complete?
NO
YES
S7
Send the
characteristic parameters.
S13
Determination
S8
Result
receiving complete?
NO
YES
S14
All complete?
NO
YES
S9
Display the
determination result.
S15
Send the
determination result.
S10
Display the
Detail information.
S16
Billing process
End
End

FIG.3

31: Item numbers

32: Position-specification conditions

33: Characteristic-parameter items

Item number	Position-specification conditions	Characteristic-parameter items
1	Slits in the ground plane Signal line extends across the slit.	Frequency of the signal transmitted along the signal line Amount of current flowing in the signal line Area of the plane formed by the signal line and the return-current path
2	LSI Via hole connected to the power-supply plane Bypass capacitor Power-supply line	Coordinates of the LSI power-supply pins Coordinates of the power-supply lines Coordinates of the bypass capacitors Coordinates of the via holes connected to the power-supply plane
3	Signal line formed on the top plane on the edge of the circuit board	Distance between the edge of the circuit board and the signal line Layer on which a signal line is located Maximum frequency of the signal transmitted in the signal line Circuit-board layer construction
4	Ground plane Power-supply plane	Circuit-board layer construction Coordinates of the power-supply plane Coordinates of the ground plane
⋮	⋮	⋮

FIG.4

31: Item numbers

34: Correction-determination standards

Item numbers	Correction-determination standards
1	The amount of radiated noise calculated from the characteristic parameters exceeds the upper limit.
2	There is not bypass capacitor on the power-supply line between the via hole and LSI power-supply pin.
3	A signal line that transmits a signal having a maximum frequency that is greater than a specified frequency is located within a specified distance from the edge of the circuit board.
4	The edges of the power-supply plane are not on the inside within a specified width with respect to the edges of the ground plane.
⋮	⋮

FIG.5

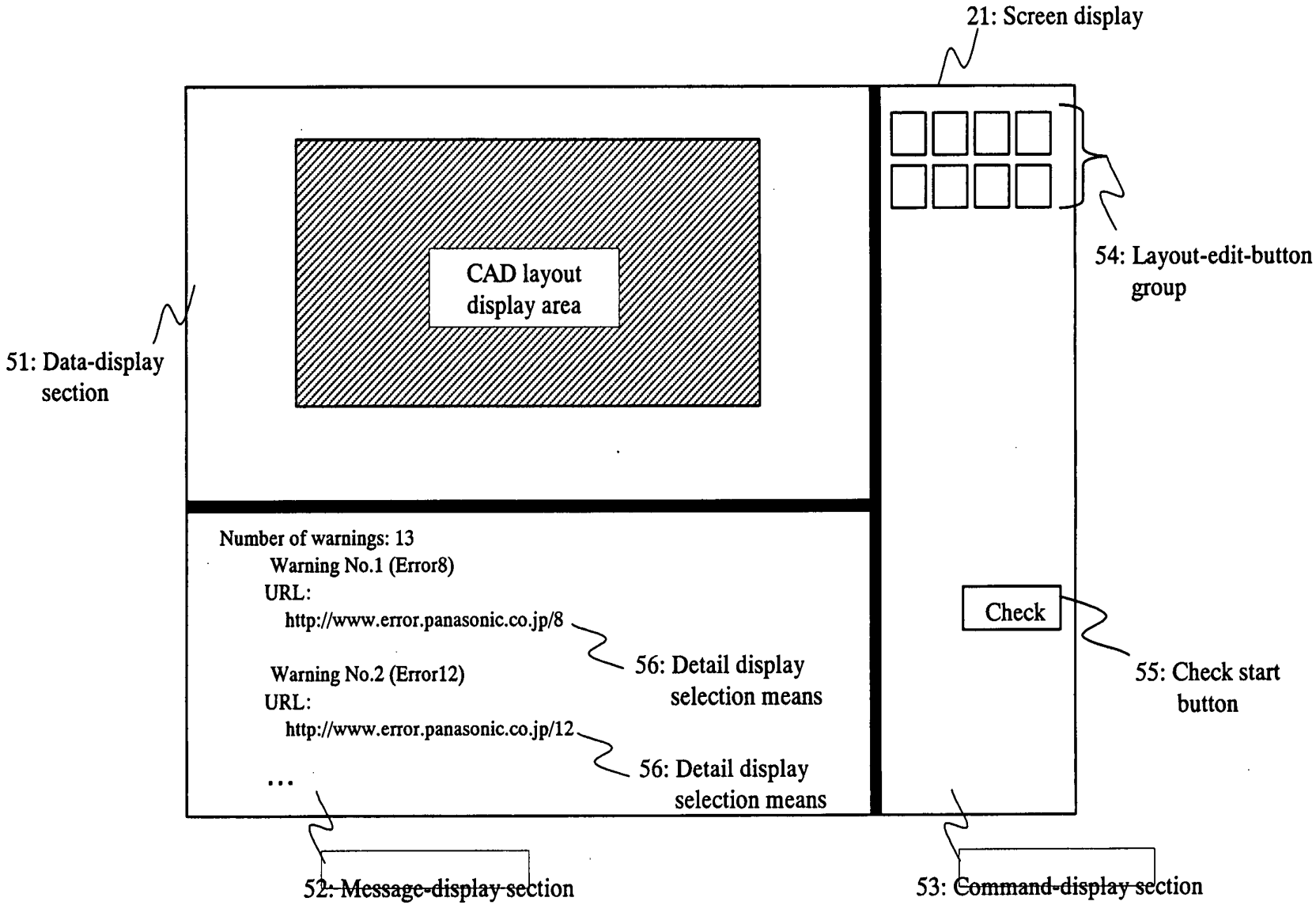
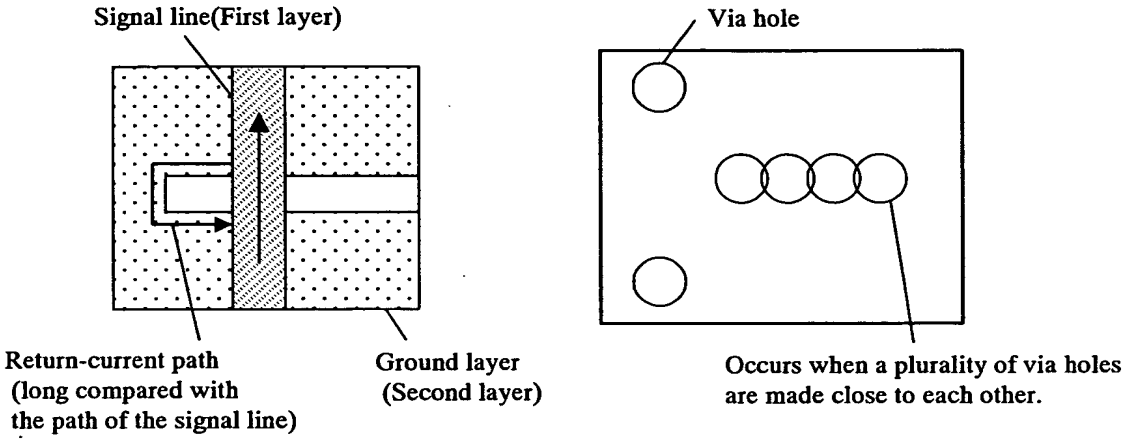

21: Screen display
CAD layout display area
54: Layout-edit-button group
51: Data-display section
Number of warnings: 13
Warning No.1 (Error8)
URL:
http://www.error.panasonic.co.jp/8
56: Detail display selection means
Warning No.2 (Error12)
URL:
http://www.error.panasonic.co.jp/12
56: Detail display selection means
...
Check
55: Check start button
52: Message-display section
53: Command-display section

FIG.6

22:Web page

1.4 Basic EMI Plan for a PCB Layout (Line Pattern)

[3] Perform layout such that the return-current path is maintained.



Error 12: Detail information
Coordinates (23.825, 121.25)
There is the possibility of an increase of radiated noise.
Cause: There is a high-speed signal line located on a slit, and the return-current path is long.

Correction method:
(1) Remove the slit under the signal line.
(2) Add a guard (ground) pattern above the slit.
(3) Make the layout of the signal line follow the path of the return-current.

FIG.7

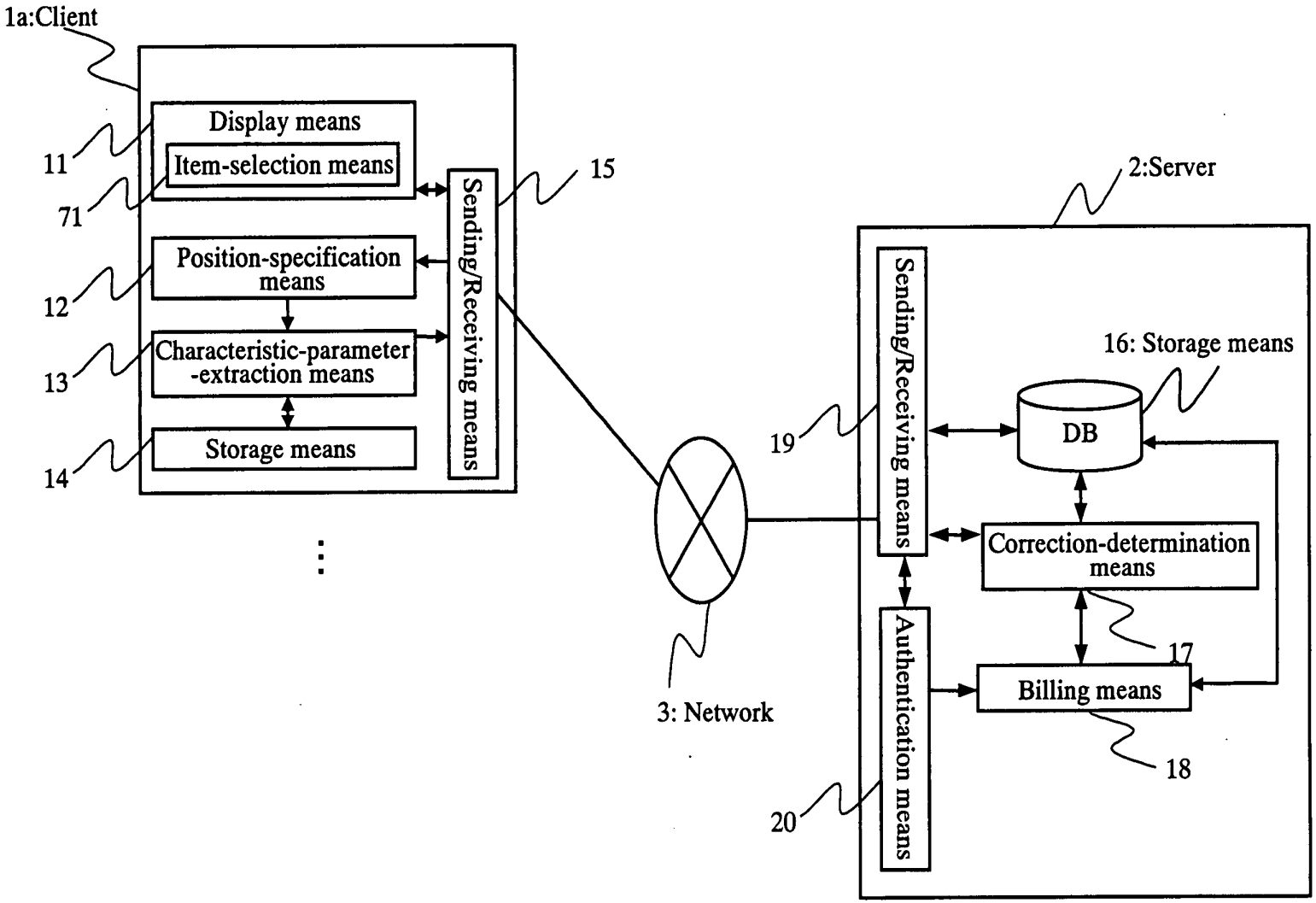

1a:Client
Display means
Item-selection means
11
71
Position-specification means
12
Characteristic-parameter -extraction means
13
Storage means
14
Sending/Receiving means
15
3: Network
2:Server
Sending/Receiving means
19
16: Storage means
DB
Correction-determination means
17
Billing means
18
Authentication means
20

FIG.8

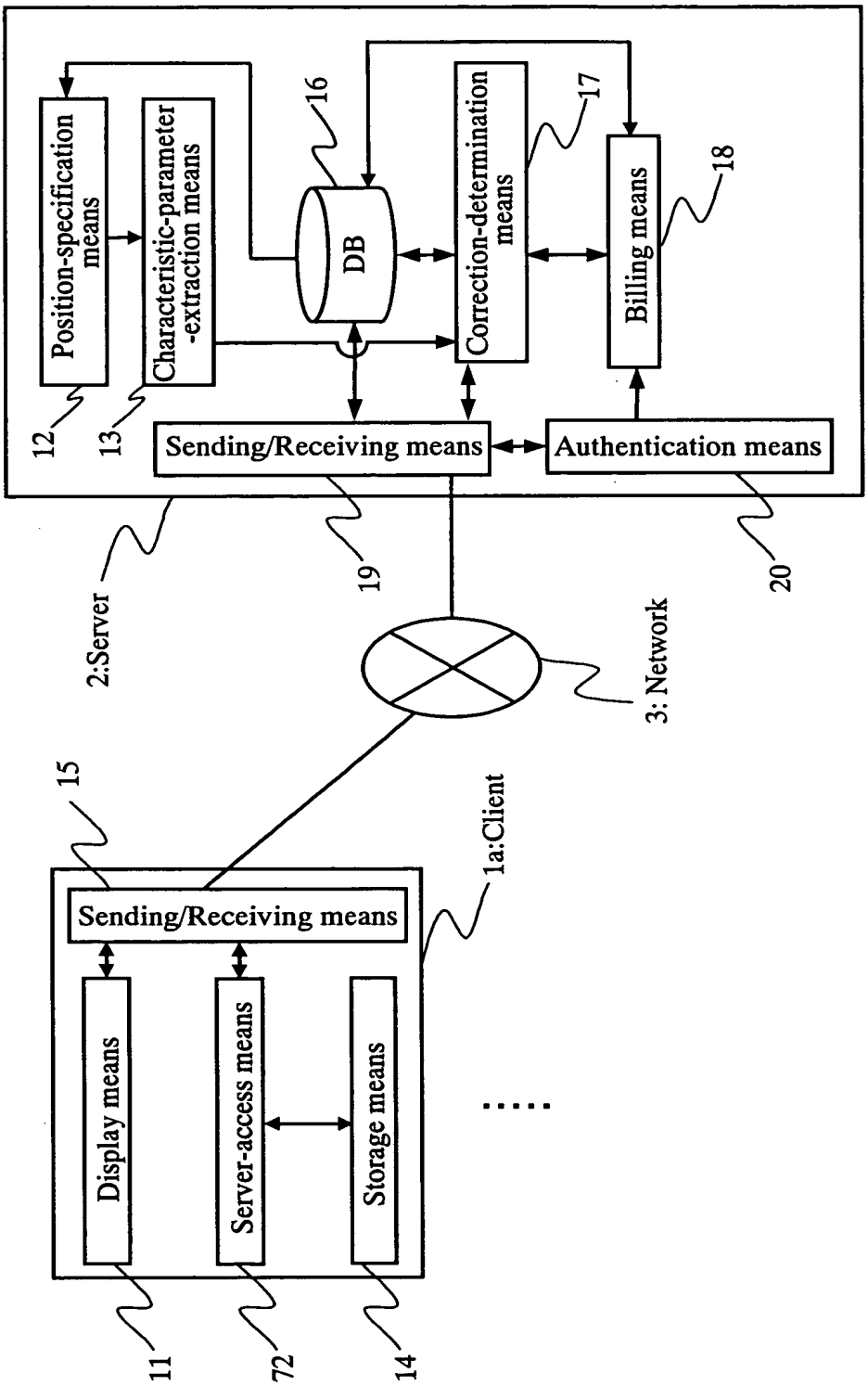

Position-specification means
Characteristic-parameter -extraction means
DB
Correction-determination means
Billing means
Sending/Receiving means
Authentication means
12
13
16
17
18
19
20
2:Server
3: Network
15
1a:Client
Sending/Receiving means
Display means
Server-access means
Storage means
11
72
14

FIG.9

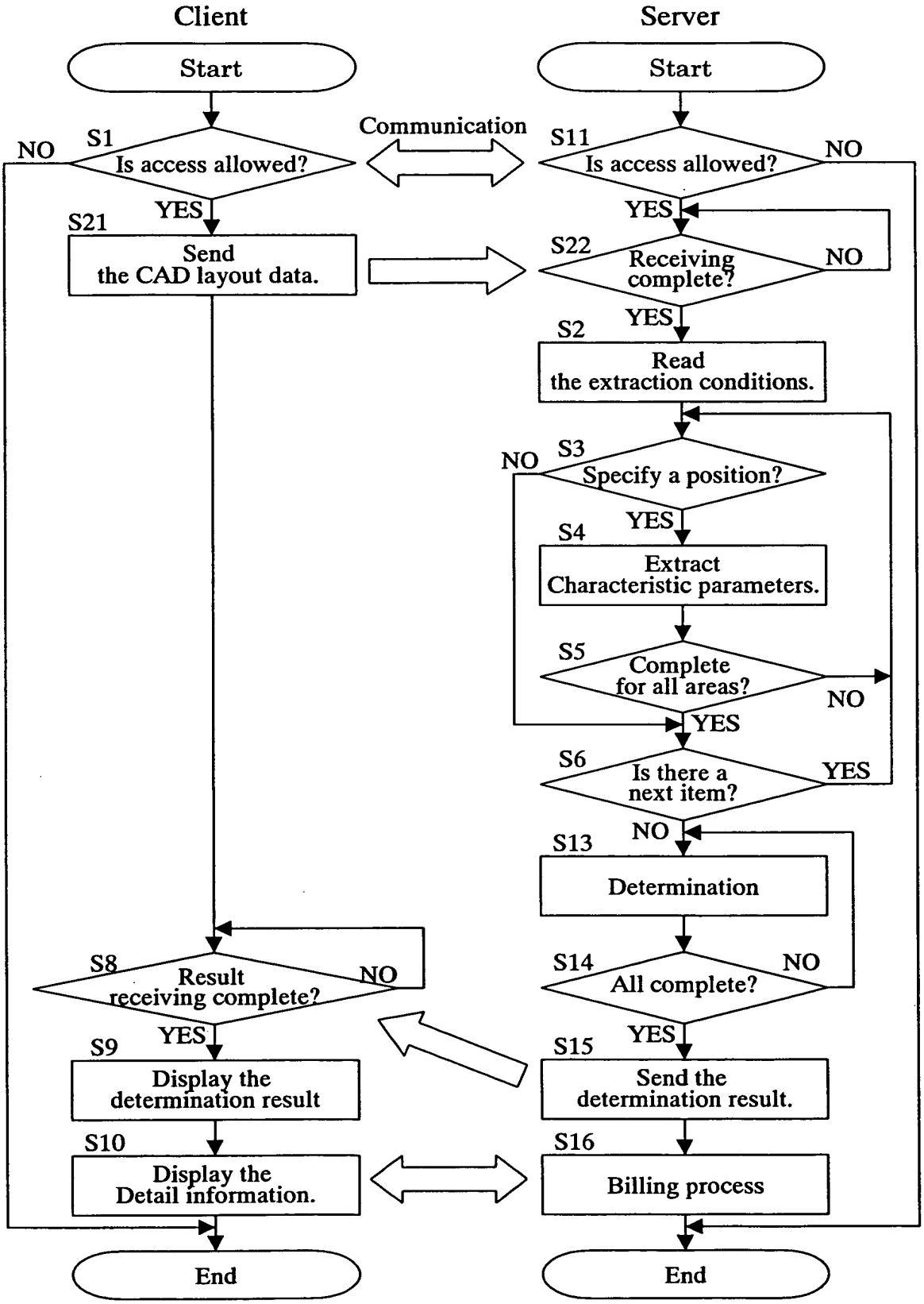

Client
Server
Start
Start
Communication
S1
Is access allowed?
NO
YES
S11
Is access allowed?
NO
YES
S21
Send
the CAD layout data.
S22
Receiving
complete?
NO
YES
S2
Read
the extraction conditions.
NO
S3
Specify a position?
YES
S4
Extract
Characteristic parameters.
S5
Complete
for all areas?
NO
YES
S6
Is there a
next item?
YES
NO
S13
Determination
S8
Result
receiving complete?
NO
S14
All complete?
NO
YES
YES
S9
Display the
determination result
S15
Send the
determination result.
S10
Display the
Detail information.
S16
Billing process
End
End

FIG.10

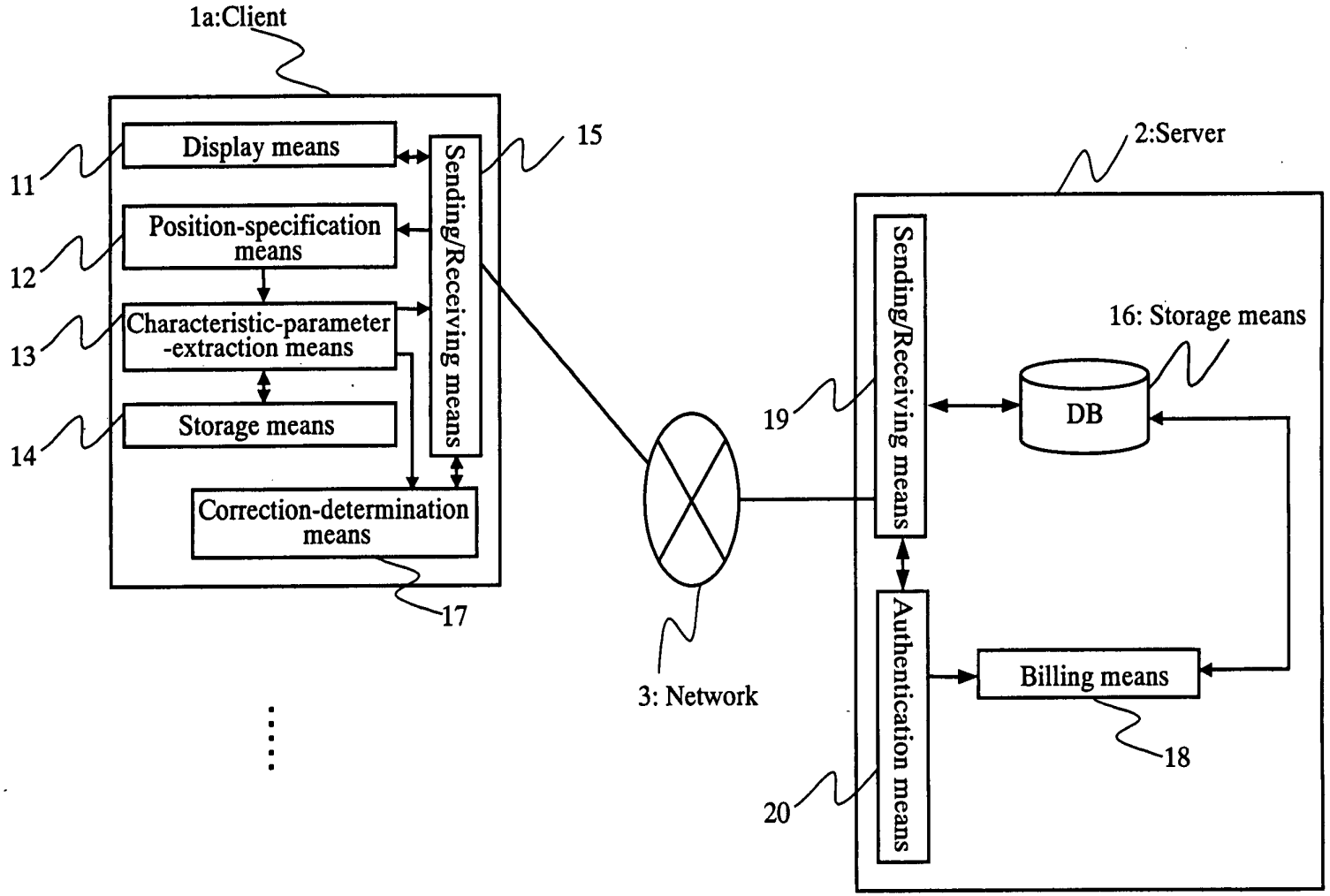

1a:Client
Display means
Position-specification means
Characteristic-parameter -extraction means
Storage means
Correction-determination means
Sending/Receiving means
11
12
13
14
15
17
3: Network
2:Server
Sending/Receiving means
16: Storage means
DB
19
Authentication means
Billing means
18
20

FIG.11

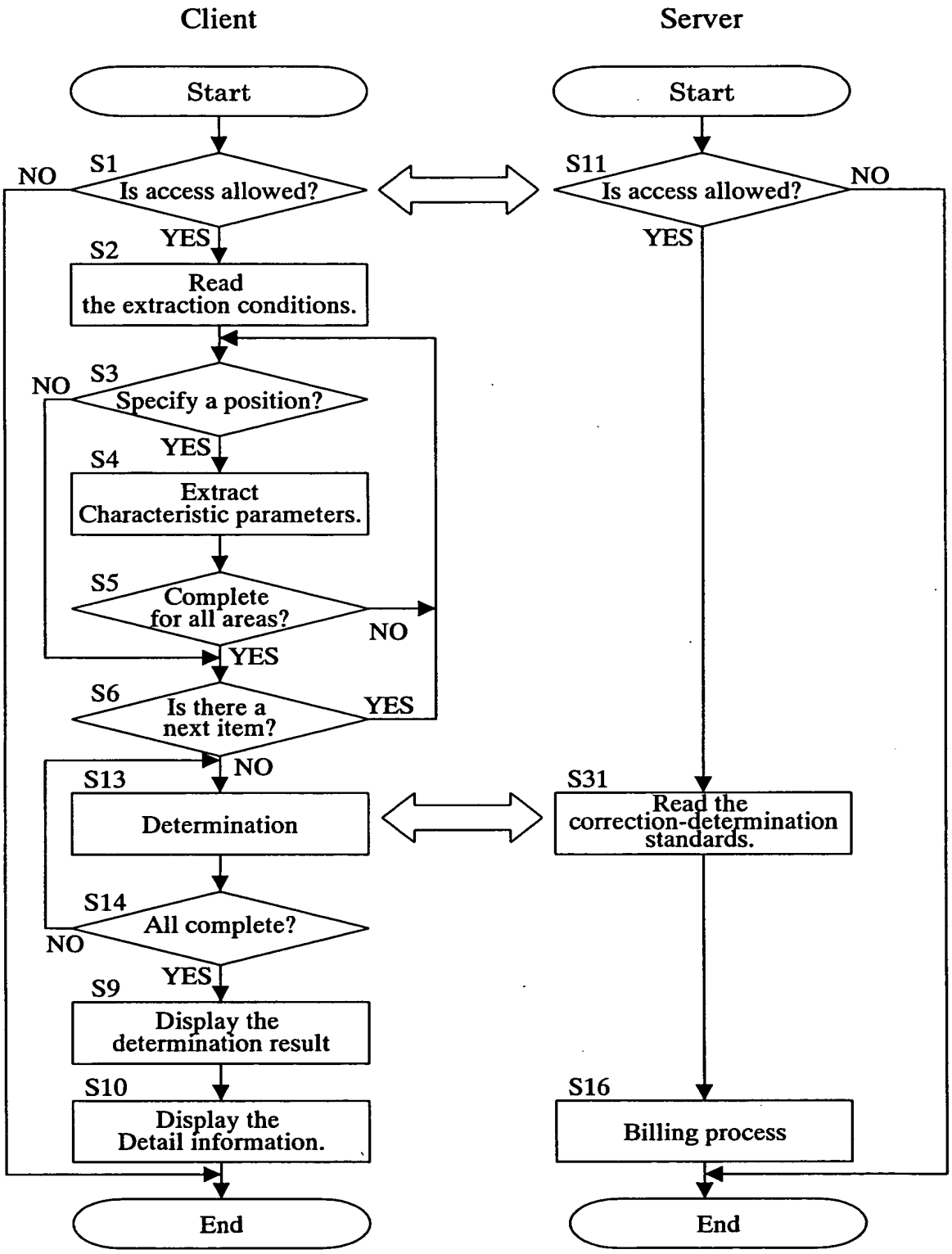

Client
Server
Start
Start
S1
Is access allowed?
NO
YES
S11
Is access allowed?
NO
YES
S2
Read
the extraction conditions.
S3
Specify a position?
NO
YES
S4
Extract
Characteristic parameters.
S5
Complete
for all areas?
NO
YES
S6
Is there a
next item?
YES
NO
S13
Determination
S31
Read the
correction-determination
standards.
S14
All complete?
NO
YES
S9
Display the
determination result
S10
Display the
Detail information.
S16
Billing process
End
End

FIG.12

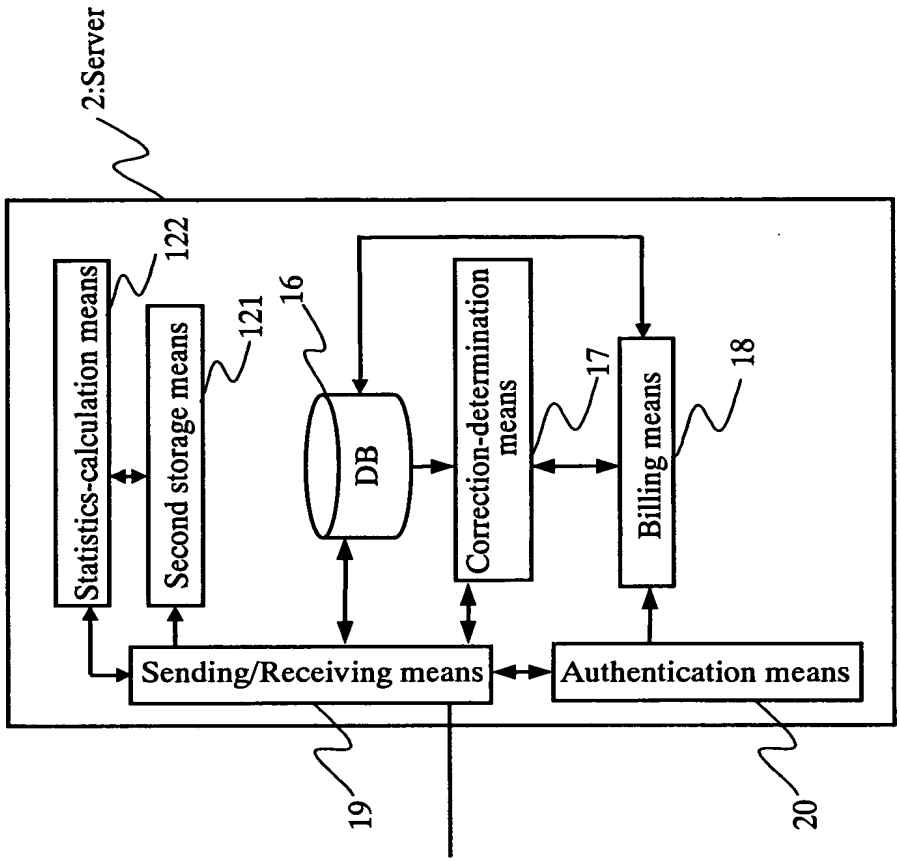
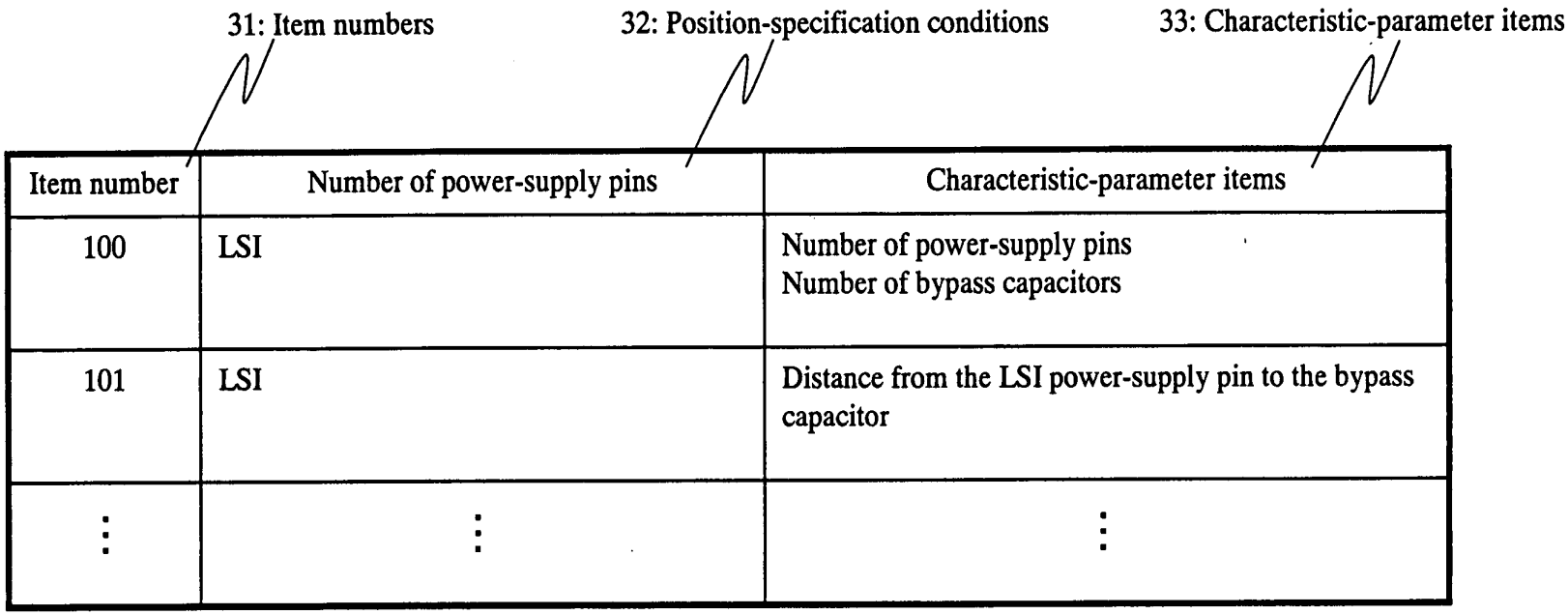

2:Server
Statistics-calculation means
122
Second storage means
121
16
DB
Correction-determination means
17
Billing means
18
Sending/Receiving means
Authentication means
19
20

FIG.13



Item number	Number of power-supply pins	Characteristic-parameter items
100	LSI	Number of power-supply pins Number of bypass capacitors
101	LSI	Distance from the LSI power-supply pin to the bypass capacitor
⋮	⋮	⋮

FIG.14

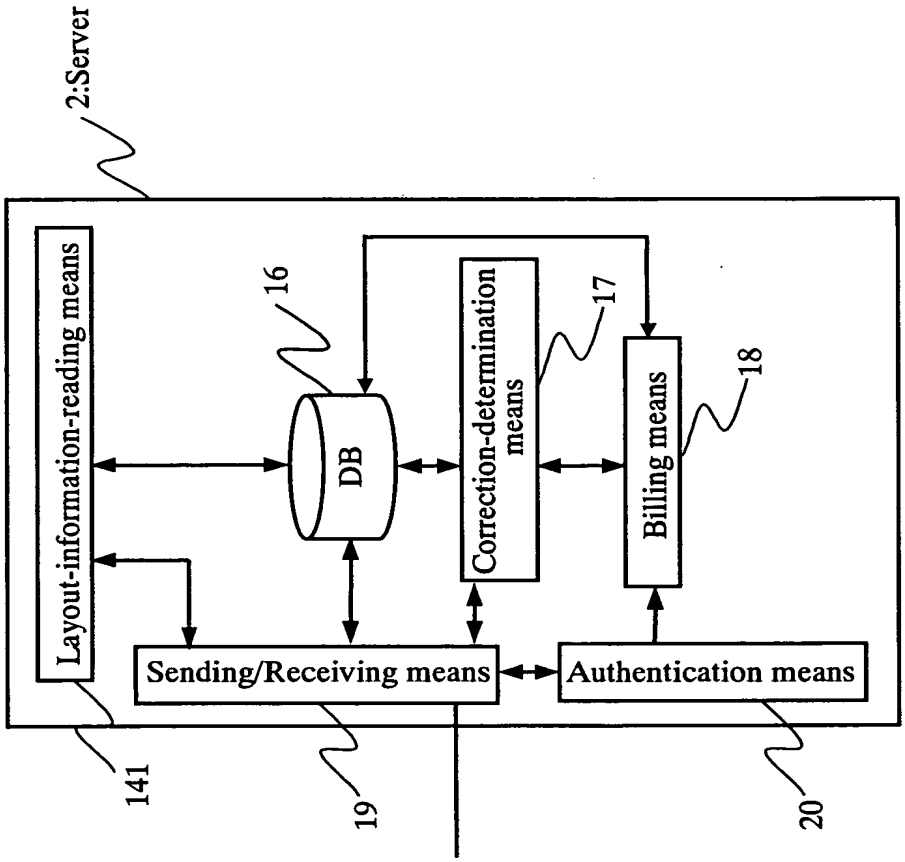
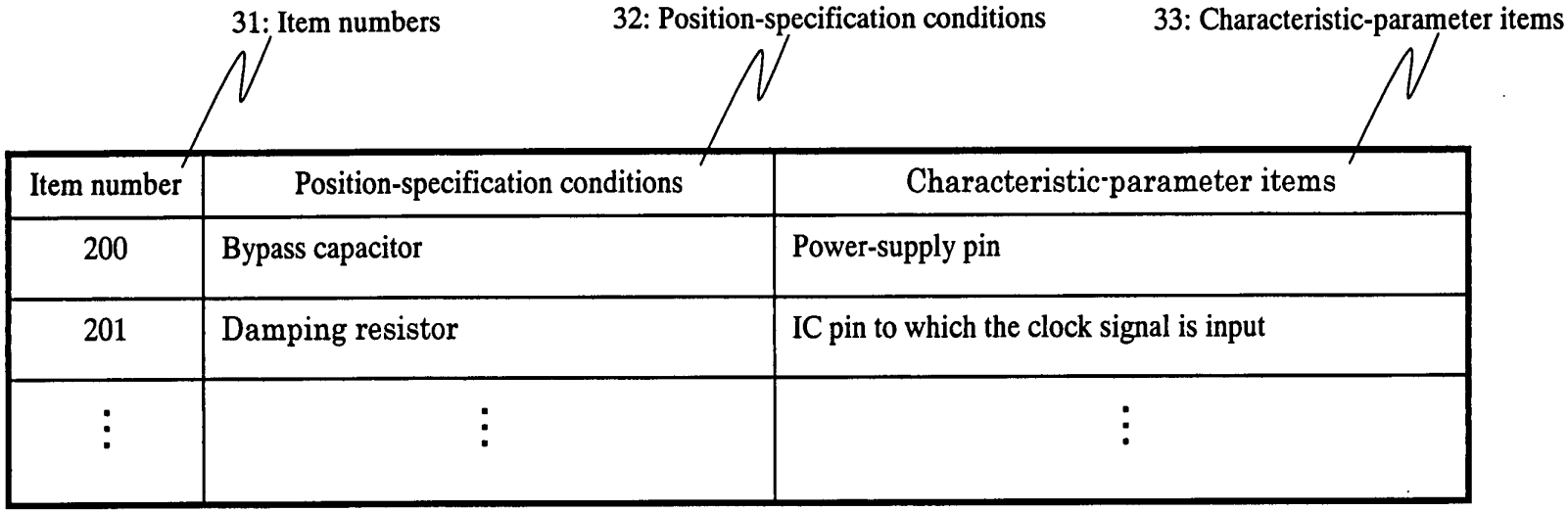

2:Server
Layout-information-reading means
16
DB
Correction-determination means
17
Billing means
18
Sending/Receiving means
Authentication means
141
19
20

FIG.15



Item number	Position-specification conditions	Characteristic-parameter items
200	Bypass capacitor	Power-supply pin
201	Damping resistor	IC pin to which the clock signal is input
⋮	⋮	⋮

FIG.16

31: Item numbers

35: Layout-design information

Item number	Information related to the CAD layout
200	The bypass capacitor is placed such that the distance to the power-supply pin or distance from the outside to the power-supply-input means is a minimum
201	The damping resistor is placed near the IC pin to which the clock signal is input.
⋮	⋮

FIG.17

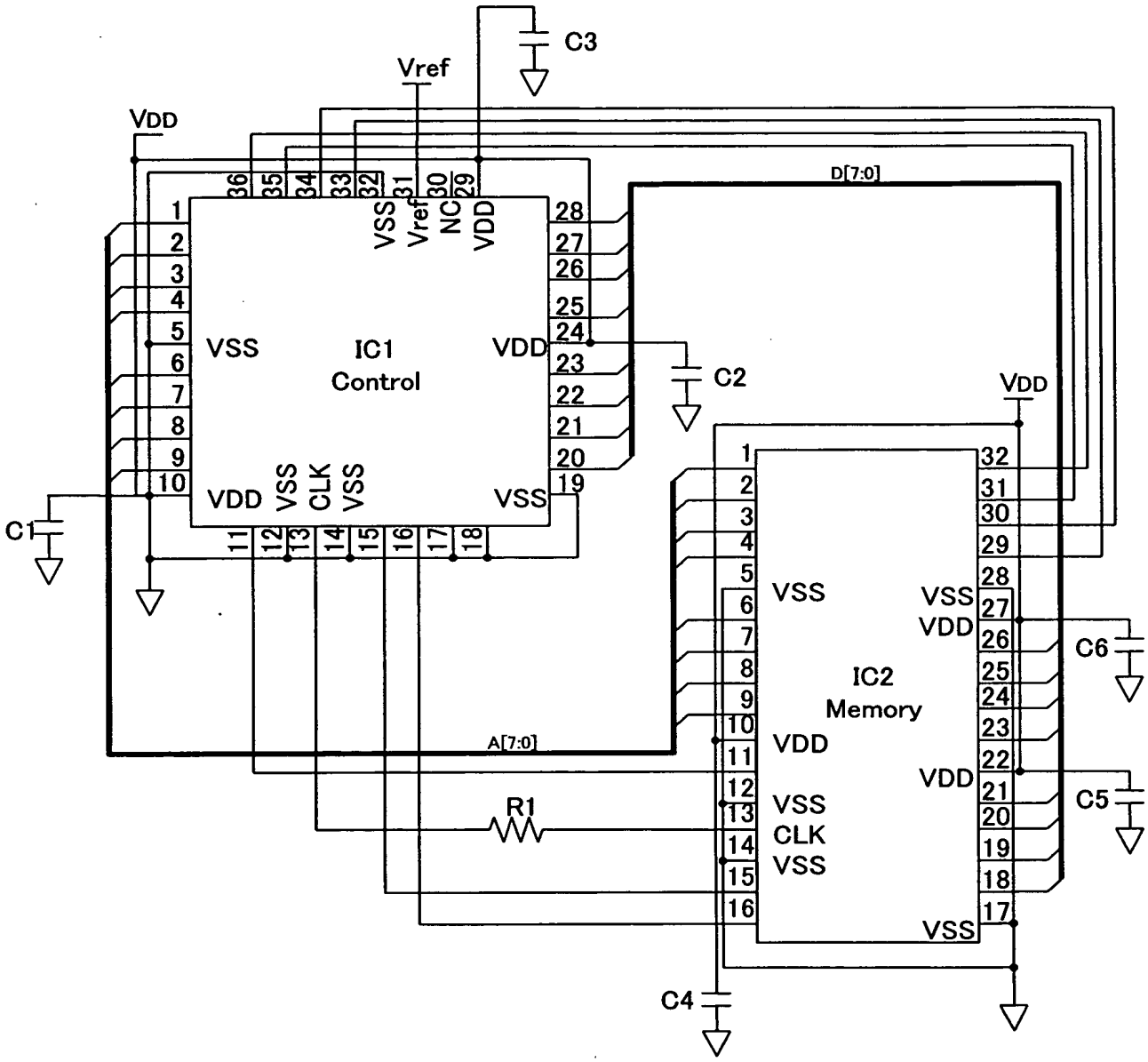
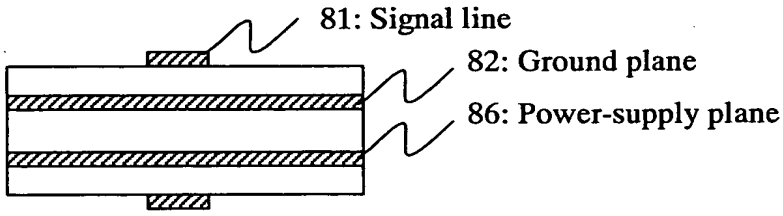

C3
Vref
VDD
D[7:0]
VSS
Vref
NC
VDD
VSS
IC1
Control
VDD
C2
VDD
C1
VDD
VSS
CLK
VSS
VSS
A[7:0]
VSS
VSS
VDD
IC2
Memory
C6
VDD
VDD
C5
R1
VSS
CLK
VSS
VSS
C4

FIG.18

(a)Cross-sectional view



(b) Top view(The insulating layer is omitted.)

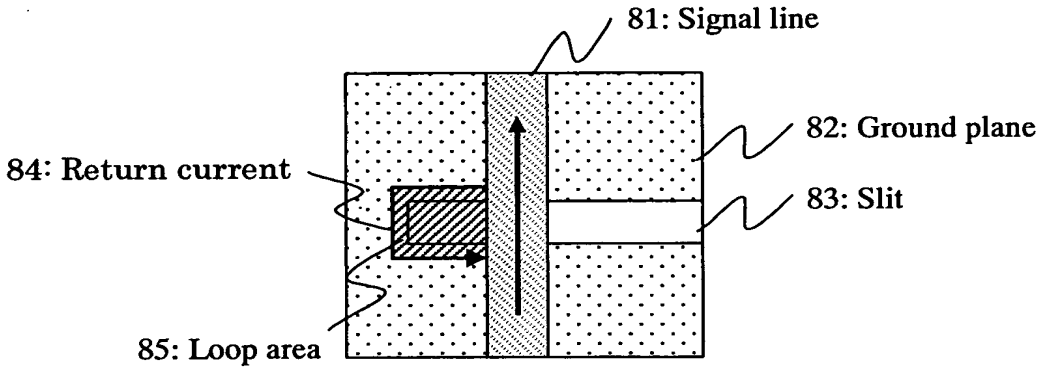
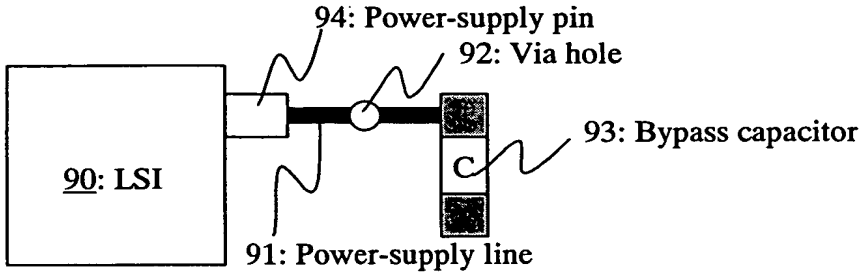


FIG.19

(a)NG



(b)OK

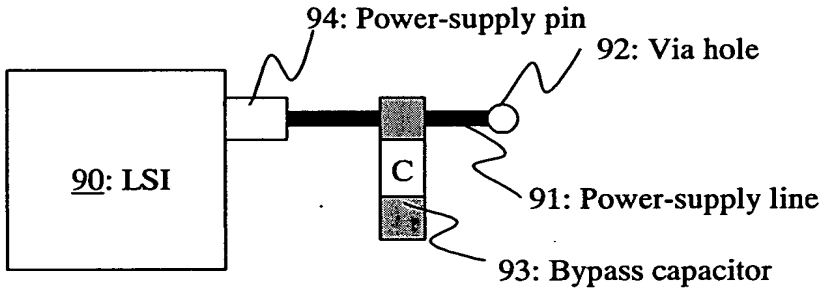
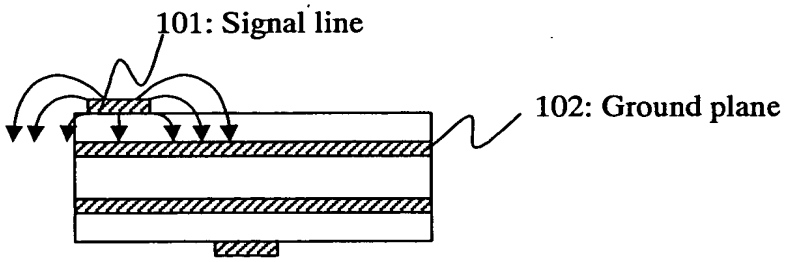


FIG.20

(a) Electric field leakage



(b) No electric field leakage

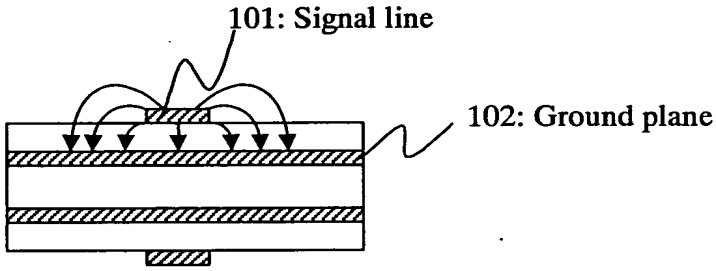
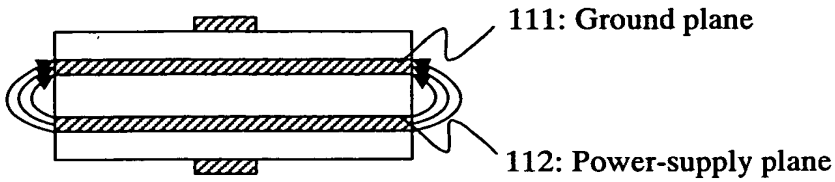


FIG.21

(a) Electric field leakage



(b) No electric field leakage